WHAT IS CLAIMED IS:

1. A medical packaging substrate comprising a polymer-impregnated paper-based web, said polymer-impregnated paper-based web being saturated with a saturant comprising a polymer emulsion having a glass transition temperature of -20°C or less.

2. The medical packaging substrate of claim 1 wherein said polymer emulsion has a glass transition temperature of about -29°C or less.

3. The medical packaging substrate of claim 1 wherein said polymer emulsion has a glass transition temperature of about -43°C or less.

4. The medical packaging substrate of claim 1 wherein said polymer emulsion has a glass transition temperature of about -60°C or less.

5. The medical packaging substrate of claim 1 wherein said polymer emulsion is added on to said polymer-impregnated paper-based web at a rate of between about 20 and about 60 dry parts per 100 dry parts of fiber in the polymer-impregnated paper-based web.

6. The medical packaging substrate of claim 1 wherein said polymer emulsion is added on to said polymer-impregnated paper-based web at a rate of between about 30 and about 50 dry parts per 100 dry parts of fiber in the polymer-impregnated paper-based web.

7. The medical packaging substrate of claim 1 wherein said polymer emulsion comprises a polyacrylate.

8. The medical packaging substrate of claim 1 wherein said polymer emulsion comprises a blend of a polyacrylate and a polymer that is not a polyacrylate.

9. The medical packaging substrate of claim 1 wherein said saturant comprises an additional polymer emulsion.

10. The medical packaging substrate of claim 9 wherein said additional polymer emulsion has a glass transition temperature of -20°C or less.

11. The medical packaging substrate of claim 9 wherein said additional polymer emulsion has a glass transition temperature of about -29°C or less.

12. The medical packaging substrate of claim 9 wherein said additional polymer emulsion has a glass transition temperature of about -43°C or less.

13. The medical packaging substrate of claim 9 wherein said additional polymer emulsion has a glass transition temperature of about -60°C or less.

14. A medical packaging substrate comprising a polymer-impregnated paper-based web, said polymer-impregnated paper-based web having a Gurley Hill porosity of less than about 9 sec/100 cc, said polymer-impregnated paper-based web being saturated with a polymer emulsion having a glass transition temperature of -20°C or less, and wherein said polymer-impregnated paper-based web exhibits a %BFE of at least about 92%.

15. A medical packaging substrate comprising a polymer-impregnated paper-based web, said polymer-impregnated paper-based web having a Gurley Hill porosity of greater than about 15 sec/100 cc, said polymer-impregnated paper-based web being saturated with a polymer emulsion having a glass transition temperature of -20°C or less, and wherein said polymer-impregnated paper-based web exhibits a %BFE of at least about 95%.

16. A medical packaging substrate comprising a polymer-impregnated paper-based web, said polymer-impregnated paper-based web having a Gurley Hill porosity of greater than about 15 sec/100 cc, said polymer-impregnated paper-based web being saturated with a polymer emulsion having a glass transition

temperature of -20°C or less, and wherein said polymer-impregnated paper-based web exhibits a %BFE of at least about 98%.

17. A medical packaging substrate according to claim 16 wherein said polymer-impregnated paper-based web exhibits a %BFE of at least about 99%.

18. A medical packaging substrate comprising a polymer-impregnated paper-based web, said polymer-impregnated paper-based web having a Gurley Hill porosity of greater than about 15 sec/100 cc, said polymer-impregnated paper-based web being saturated with at least two polymer emulsions wherein at least one of said polymer emulsions has a glass transition temperature of -20°C or less, and wherein said polymer-impregnated paper-based web exhibits a %BFE of at least about 98%.

19. The medical packaging substrate of claim 18 wherein one of said at least two polymer emulsions has a glass transition temperature of about -43°C or less.

20. The medical packaging substrate of claim 19 wherein both of said at least two polymer emulsions have a glass transition temperature of about -43°C or less.